

# Bag Carrier

## DESIGN RATIONALE

### Introduction

The bag carrier is a low-cost, 3D-printed handheld tool that distributes the weight of bags carried. This 3D Printed Assistive Device can assist people with arthritis or other disabilities to carry plastic bags and reusable bags. The bag handles can easily loop around the two curved hooks. The handle is rounded to allow users to comfortably grip the carrier.

### Research

In order to determine how strong the bag carrier must be, it was required to determine how much weight someone can comfortably carry with one arm. It was found that 25lbs could be considered on the heavy end of what someone might carry in their grocery bags with one arm.

In order to design different sized handles, glove sizing charts were researched to help determine appropriate sizing.

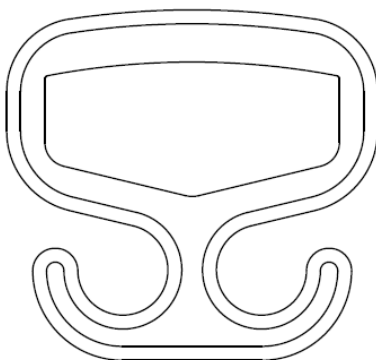
### Requirements

There was a pre-existing bag carrier on the MMC site. It was found that this handle had too long of a print time and was quite bulky. With those in mind, the key requirements for the new design were:

- That it is strong enough to carry groceries
- Decrease the print time

### Ideation

It was thought to design a handle with 2 handles in somewhat of a T formation in order to increase the strength vs size of the handle. It was also thought to have 3 different sizes to better accommodate different sized hands.



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### Prototyping

Several prototypes were made during the duration of this project. Factors that changed between prototypes included: height and width of handle hole, handle thickness, hook size, and how rounded the handle was. The width of the handle holes was determined by using a glove sizing chart to determine a suitable small medium, and large sized handle. The height of the handle hole increases for the larger sizes. The handle was rounded after initial prototypes had rougher edges that were undesirable if the user used the bag carrier for an extended period of time. The hook size was optimized through strength testing.

### Testing

Strength testing was conducted on the handles to ensure that the handles were strong enough to carry a load of groceries. A safety factor of 2 was applied during the testing period, testing up to 50lbs on the handles which is way above what the average person would comfortably. Testing allowed for the size of the hooks to be optimized – making the hooks smaller allowed the print time of the bag carrier to stay low. Handles were tested in one-minute intervals holding 20, 30, 40 and then 50lbs. It was considered a successful design when it was able to hold 50lbs for 1 minute without breaking.

### Final Design

Found below is a picture of the 3 different sized handles, large (left), medium (middle), and small (right). Each handle has the same size hooks and can hold approximately the same weights.

